

## CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1        1.        A connector assembly for connecting a surgical tool to  
2        a surgical instrument, the connector assembly comprising:  
3                a gripper having a centrally located bore;  
4                opposing shelves formed in the centrally located bore of the gripper,  
5        the opposing shelves forming an elongated slot within the bore;  
6                a shaft having a longitudinal slot along a length thereof and  
7        adjacent sections having predetermined cross sections, the predetermined  
8        cross sections prohibiting movement of the shaft when the gripper is in a  
9        first position; and  
10              a biasing spring mating with the gripper and the shaft, the biasing  
11        spring biasing the gripper in the first position.  
  
1        2.        The connector assembly of claim 1, wherein the gripper is rotatable  
2        between the first position and a second position remote from the first  
3        position.  
  
1        3.        The connector assembly of claim 1, further comprising a cam follower  
2        formed in the shaft, the cam follower having a first end of travel  
3        corresponding to the first position a second end of travel corresponding to  
4        a second position remote from the first position.  
  
1        4.        The connector assembly of claim 3, further comprising:  
2                a side through hole formed within the gripper, the side bore  
3        corresponding to the cam follower; and  
4                a pin positioned through the side through hole of the gripper and

5 communicating with the cam follower, wherein  
6 the biasing spring biases the gripper towards the first end of travel  
7 of the cam follower corresponding to the first position, and  
8 the gripper is capable of rotating about the shaft and moving along a  
9 length of the shaft by traveling along the travel of the cam follower between  
10 the first position and the second position.

1 5. The connector assembly of claim 1, wherein the adjacent sections are at  
2 least three adjacent sections.

1 6. The connector assembly of claim 5, further comprising a stop  
2 mechanism in a third section of the at least three adjacent sections, wherein  
3 the longitudinal slot extends to the stop mechanism.

1 7. The connector assembly of claim 5, wherein a shoulder is formed  
2 between a first of the three adjacent sections and an adjacent section of the  
3 three adjacent sections.

1 8. The connector assembly of claim 7, wherein the shoulder prohibits the  
2 movement of the shaft when the gripper is in the first position.

1 9. The connector assembly of claim 7, wherein an opposing shoulder is  
2 formed between a third section of the three adjacent sections and the  
3 adjacent section.

1 10. The connector assembly of claim 9, wherein the shoulder and the  
2 opposing shoulder are positioned over ledges of the shelves when the  
3 gripper is in the first position thereby locking movement of the gripper.

1 11. The connector assembly of claim 9, wherein the adjacent section of the

- 2 three adjacent sections has a cross section different than the first and the  
3 third sections of the three adjacent sections.
- 1 12. The connector assembly of claim 9, wherein the adjacent section of the  
2 three adjacent sections and the third section of the three adjacent sections  
3 have a different circumference.
- 4 13. The connector assembly of claim 1, wherein the adjacent sections are  
5 at least five adjacent sections each having a shoulder formed therebetween.
- 1 14. The connector assembly of claim 13, wherein at least four of the at  
2 least five adjacent sections each have a different cross section.
- 1 15. The connector assembly of claim 13, wherein at least two of the at least  
2 five adjacent sections have a substantially same cross section.
- 1 16. The connector assembly of claim 13, wherein at least four of the at  
2 least five adjacent sections have a different circumference.
- 1 17. The connector assembly of claim 16, wherein each circumference of  
2 the different circumference becomes progressively larger in a stepped  
3 fashion.
- 1 18. The connector assembly of claim 1, further comprising opposing  
2 shoulders formed between sections of the adjacent sections, wherein the  
3 opposing shoulders substantially become aligned with a longitudinal axis of  
4 the elongated slot as the gripper moves between the first position and a  
5 second position remote from the first position.
- 1 19. The connector assembly of claim 1, wherein the longitudinal slot of the

2 shaft is substantially orthogonal with a longitudinal axis of the elongated  
3 slot when the gripper is in the first position.

1 20. The connector assembly of claim 1, wherein  
2 the shaft includes four adjacent sections,  
3 a shoulder is formed between each adjacent section, and  
4 the shoulder formed between a first section and a second section  
5 and the shoulder formed between a third section and a fourth section of the  
6 four adjacent sections are positioned over opposing ledges of the shelves  
7 when the gripper is in the first position thereby locking the motion of the  
8 gripper.

1 21. A connector assembly, comprising:  
2 a collet having a first section, a second section and a third section;  
3 a first shoulder being formed between the first section and the  
4 second section;  
5 a second shoulder being formed between the second section and the  
6 third section;  
7 a slot extending partially along a length of the collet;  
8 a gripper having a centrally located bore, the gripper being rotatable  
9 about the collet;  
10 a pair of shelves located within the centrally located bore of the  
11 gripper, the shoulder and the second shoulder being aligned over opposing  
12 ledges of each of the shelves when the gripper is biased in a first position.

1 22. The connector assembly of claim 21, further comprising an elongated  
2 slot formed between the shelves, the slot of the collet being orthogonal to a  
3 longitudinal axis of the elongated slot when the gripper is in the first  
4 position.

- 1 23. The connector assembly of claim 22, wherein the slot of the collet is  
2 substantially parallel with the longitudinal axis of the elongated slot as the  
3 gripper is rotated toward a second position from the first position.
- 1 24. The connector assembly of claim 21, further comprising a cam  
2 mechanism, the cam mechanism allows the gripper to move and rotate  
3 between the first position and a second remote position about the collet.
- 1 25. The connector assembly of claim 24, further comprising a biasing  
2 spring connected between the gripper and the collet, the biasing spring  
3 biasing the gripper in the first position.
- 1 26. The collet assembly of claim 21, further comprising a nose portion  
2 positioned partially about the collet and within the centrally located bore of  
3 the gripper, the nose portion having a slot which is aligned with the slot of  
4 the collet.
- 1 27. The connector assembly of claim 21, wherein a terminal portion of the  
2 slot of the collet is a stop mechanism.
- 1 28. The connector assembly of claim 21, wherein the gripper includes a  
2 first end and a second end, each having a different inner circumference.
- 1 29. The connector assembly of claim 21, further comprising a connecting  
2 arm pivotally coupled to the collet at an end remote from the slot.
- 1 30. A surgical instrument, comprising:  
2 a housing;  
3 a motor positioned within the housing;  
4 a collet pivotally connected to the motor connecting arm, the collet

5 including a connector assembly for connecting a surgical tool to the collet,  
6 the connecting assembly including:

7 a gripper having a centrally located bore, the gripper further  
8 having a first section, a second section and a third section, the second  
9 section having a different cross section than either of the first section and  
10 the second section;

11 opposing shelves formed in the centrally located bore of the  
12 gripper, the opposing shelves forming an elongated slot within the bore;

13 a longitudinal slot formed along a length of the collet;

14 a shoulder formed between the first section and the second  
15 section;

16 an opposing shoulder formed between the second section  
17 and the third section,

18 wherein the shoulder and the opposing shoulder prevent  
19 movement of a surgical tool when the gripper is biased in a first position.

1 31. The surgical instrument of claim 30, wherein the longitudinal slot of  
2 the collet is orthogonal to a longitudinal axis of the elongated slot when the  
3 gripper is in the first position.

1 32. The surgical instrument of claim 31, wherein the longitudinal slot of  
2 the collet is substantially parallel with the longitudinal axis of the elongated  
3 slot as the gripper is rotated toward a second position from the first  
4 position.

1 33 The surgical instrument of claim 30, further comprising a cam  
2 mechanism which allows the gripper to rotate between the first position and  
3 a second remote position about the collet.

1 34. The surgical instrument of claim 30, further comprising a biasing spring

2 connected between the gripper and the collet, the biasing spring biasing the  
3 gripper in the first position.

1 35. The collet assembly of claim 30, further comprising a nose portion  
2 positioned partially about the collet and within the centrally located bore of  
3 the gripper, the nose portion having a slot aligned with the slot of the  
4 collet.

1 36. The surgical instrument of claim 30, wherein a terminal portion of the  
2 slot of the collet and a step pin associated with the collet is a stop  
3 mechanism.

1 37. The surgical instrument of claim 30, further comprising a connecting  
2 arm assembly pivotally coupled between the collet and the motor  
3 connecting arm.

1 38. The surgical instrument of claim 30, further comprising a surgical tool  
2 having a shaft coupled to the collet.

1 39. The surgical instrument of claim 38, wherein:  
2 the surgical tool has a first section, a second section and a third  
3 section, the second section having a different cross section than either of  
4 the first section and the second section;

5 a shoulder formed between the first section and the second  
6 section;

7 an opposing shoulder formed between the second section  
8 and the third section,

9 wherein the shoulder and the opposing shoulder of the  
10 surgical tool are positioned on opposing sides of the shelves of the gripper  
11 such that when the gripper is in the first position the shoulder and the

12        opposing shoulder of the surgical tool are positioned over the shelves thus  
13        preventing the movement of the surgical tool within the slot of the collet.

1        40. The surgical instrument of claim 39, wherein the first section, the  
2        second section and the third section of both the surgical tool and the collet  
3        have substantially same cross sections.

1        41. The surgical instrument of claim 39, wherein the shoulder and the  
2        opposing shoulder of the surgical tool are positioned on opposing sides of  
3        the shelves of the gripper such that when the gripper is in a second position  
4        remote from the first position the shoulder and the opposing shoulder of the  
5        surgical tool align within the elongated slot of the gripper thereby allowing  
6        the surgical tool to be removed from the collet.